



جامعة صنعاء
كلية الطب والعلوم الصحية
دفعة بصمة طبيب 31
طب بشري

Lecture No. 23

ophthalmology

RETINA

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Group F

اللجنة العلمية لدفعة بصمة طبيب 31

مندوب الدفعة

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Retina :-

* Gross Anatomy:-

- it is the innermost layer of the eyeball (مائلها)
- it's very thin and transparent showing the red colour of choroid (نحافةها)
- it's starts at ora serrata and ends optic disc (مرودها)
- it's sensitive only to light (translates photons to electrical impulses that reach the visual cortex and transformed into a visual sensation) (وظيفتها)

* Anatomically:-

the retina is divided into:-

- [1] Central Retina:- Macula Lutea = 5.5 mm, the center of the macula is a vascular depression red dark core called (Fovea) Fovea centralis (1.5 mm) the center of Fovea is called → Foveola is 0.36 mm or 36 micro

the Function:- (Mainly Cones) Responsible For visual acuity, color; day vision

- [2] peripheral Retina:- ends at the ora serrata

the Function:- (Mainly Rods) responsible For night and peripheral Field.

* حيث ان center يشوف قرون حيز اسمة (head of optic nerve) ←

يمكن تشوف فيه الـ optic cup, size, colour, shape

- Shape:- rounded shape

- size:- 1.5 mm

- colour:- pinking → لونها لاساسي ولكن عندها تفرع فاعمال blood vessels (reds) يرفع لونها pinking.

- Adge:- will divide Age (واضح جدا)

(papili edema) ← bland ← if

* in the center عينا حفرة called cup → blood vessels

N.B:- the cup dis ratio diameter is 0.3 disc diameter (في حالة زاد الحجم عن الـ 0.3 في هذه الحالة نشك انة ممكن يكون glaucoma)

* The end artery if we blocked it has to death every cells around the artery.

* this artery associated white vein is called central Retinal Vein. الوريد المركزي, ischemia

* الوريد المركزي شريح في صورة الـ (Temporal, Nasal) branch

* The layer of Retina :- From outside to inside :-

- [1] The retinal pigmented epithelium.
- [2] The layer of visual receptors (cones and Rods)
- [3] The external limiting membrane.
- [4] The outer nuclear layer.
- [5] The outer plexiform layer
- [6] The inner nuclear layer (papillary cell)
- [7] The inner plexiform layer
- [8] The ganglion cell layer → axon that formed the optic nerve
- [9] The nerve Fiber layer
- [10] The internal limiting layer.

* المنطقة عند ما يسمى على الـ Retina يتشكّل جزء من في المنطقة الأولى، والسماة هكذا في كل طبقة يتشكّل جزء عشوائياً في جميع الصور الباطنية وهذه هي المنطقة الـ (Fovea)

* The Rods and cones :- *

DDx	Rods	Cones
Shape	rods	cones
Size	thin	thick
Site	peripheral	central
vision	night	day light
cell	Rhodopsin	Iodopsin
Number	120 million	6 million

ملاحظة :- الـ Fovea لا تحتوي على الـ Rods أبداً فقط تحتوي على الـ cones.

* Blood supply of Retina :-

[1] Inner lamina are supplied by the central retinal artery a branch of ophthalmic artery.

[2] The outer include rods and cones macula and Fovea is avascular and receive nutrition by diffusion from the choroid capillary.

[3] cilioretinal artery

[4] The central retinal vein ends in the cavernous sinus.

* اذا حصل آي شئ في الـ Retina لم يستطع يخرج ما بداخله الـ Fovea
(congestive necrosis) يستقر

* how do the diffusion?

عندما يسقط الـ light على photo receptors $\rightarrow$ photo chemical change

منه ينتج تفرق في الضوء ويرجع مرة ثانية يستقر في القلعة

* Cones $\rightarrow$ Form sense $\rightarrow$ color vision + day vision (photopic)

* Rod $\rightarrow$ light sense $\rightarrow$ movement + night vision (scotopic)

* Fibers $\rightarrow$ brain $\rightarrow$ visual sensation.

* The Function of (RPE) ^[1] prevent light reflection.

[2] vit A metabolism.

[3] تجميع الانسجة الميتة

* How to Exam the Retina :-

[1] by Fund scopy $\rightarrow$ Direct
 $\rightarrow$ Indirect

[2] Slit lamp bio-microscopy.

[3] Funds camera $\leftarrow$ كاميرا Funds

N.B:- if the cornea is hazy or if pt has cataract we should
Examine by US

The Direct and indirect of Fundoscopy:-

Direct	indirect
Erect image	vertically and laterally inverted image
Magnification 15x	Magnification 3x
Field smaller (details of lesion)	Field large (general look and to see the periphery)
Unocular	Binocular
No stereopsis	stereopsis <u>قوة البصر</u> :- to see elevated lesions.

* Retinal Haemorrhage and Exudate:-

[1] superficial :- Flame shape blood tracks along nerve fibers layer.

[2] Deep :- reach the Bruch's membranes

- Blot haemorrhage : large

- Dot haemorrhage :- small

* Exudate:-

- Hard Exudate :- yellowish-white with regular margin due to leakage of lipoproteins.

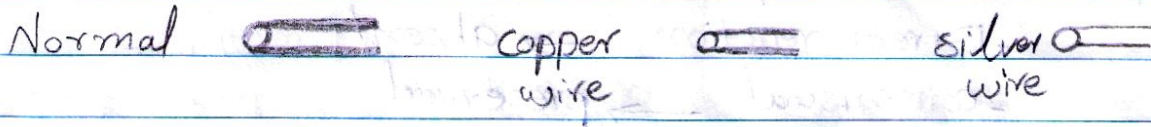
- Soft (cotton-wall) :- grayish-white irregular margin due to micro infarct due to ischemia.

* قطنية (cotton wall) :-

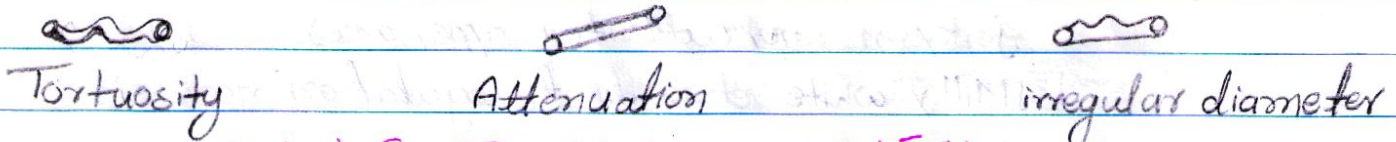
* Vascular sclerosis :-

They mean it's the physiological change.

- [1] light reflex change اللون النحاسي copper wire اللون الفضي silver wire (الفبري) Fibers لكن عندما يزيد الـ

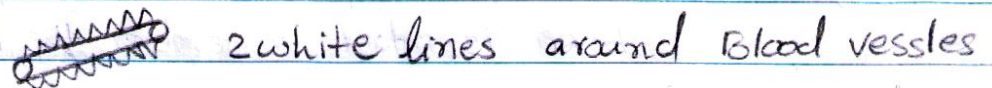


- [2] changes in course and diameter.



* الكان الذي يكون فيه Fibrosis أكثر كثافة والكان الذي يكون فيه واسع

- [3] Sheathing and vessels.



- [4] Arterio-venous crossing change

* Central Retinal Artery occlusion (CRAO) :-

- [1] Thrombosis :- in the people with arteriosclerosis in old age, DM, hypertension, hyperlipidemia.

- [2] Embolism :- From heart or large vessels.

* Carotid emboli :-

[1] Cholesterol

[2] Calcific

[3] Fibrin-platelet



* يبيّن المريض يقول أنا سامع نظري تفتق شوية وبعدني يرجع (Signs)
وعناها أنت هذا الدجل ممكن يجعل منية ← Central Retinal artery occlusion
 ويكون يسبب واحد من الـ 3 الأسباب السابقة.

* So we must should take care about him self

Sudden painless loss of vision

Giant cell arteritis ← (painful) الذي هو *

* Signs :-

1- pupil :- Afferent pupillary defect

- Direct reaction → absent

- consensual → preserved

2- Fundus :-

[1] attenuated arteries
[2] veins :- blood get broken in pools which move in jerky manner (cattle truck appearance)

[3] Milky white retina due to coagulation necrosis of inner layers.

[4] cherry red spots in Fovea : color of choroid, because Fovea is intact "remember the B.S"

* branch cells :-

The occlusion happen in 2-3 hours → 2-3 weeks.

* The Retina → micron → nephrotic tissue → atrophic membrane.

* The optic atrophy means the axon of ganglion layer is death.

the aim of treatment :- How to make vasodilation with the aim relieving the spasm and driving the embolus a smaller branch.

The Local treatment :- massage → دليك العين أو دوائها
ولتق سرعة أو لتفتح العين وتغلي السائل دليغ.

*

* Central Retinal vein occlusion (CRVO) :-

- [1] in the vein wall → in old age, D.M, HTN, atherosclerosis
- [2] inside the vein → hyper viscosity syndrome, blood stasis, coagulopathy, dehydration, polycythemia.
- [3] outside the vein → pressure on CRV (orbital cellulitis, orbital tumor).

* علامته :- عادتاً يوجد الـ (CRVO) في الليلى due to stases of blood flow فتكون شحوة الحدفي يصحب من انفا مايشوف الدنيا تمام تبقي تقصر الـ pupil حقه شحوة

* 2 Type of (CRVO) :-

- 1- Ischaemic CRV occlusion anterior to lamina cribrosa. → disc short area it's like (safe light) يدخل axon of optic nerve. there is no collateral circulation.
- 2- Non-ischaemic CRV occlusion :- posterior to lamina cribrosa where the collateral ↓ the risk of ischemia with moderate Fundus changes.

* Exam the Fundus :-

شحوة تلة أمار يشعل فحيف جداً :-

- [1] vein engorged and tortuous
- [2] opto-ciliary shunt papili edema
- [3] Retina show extensive hemorrhage. (dots, blots and Flame shaped) edema. cotton wool exudates + micro aneurysms.
- [4] Macula :- show edema
- [5] Disc :- Hyperaemic, edematous (papilloedema)

* ischemic Retina produce the vaso constans

The investigation :-

general :- BP, ECG, CBC, blood glucose level, lipid profile, Chest x-ray.

* ~~Local~~ - OCT to detect Macular edema

- Hyporeflective spaces within the macula

- ↑ in macular thickening with loss Foveal depression.

* Treatment:- new blood vessels in Retina treated by the
Lezer photo coagulation

- control hypertension and D.M.

- Follow up till neovascularization or Macular edema.

- intravitreal → [1] steroids (Triamcinolone acetonide)

[2] Avastin (anti VEGF)

* **Vascular Retinopathy:-**

Def:- retinal affection

Retinopathy ← * المرض المتعلق بالشبكية

[1] change blood vessels

[2] exudate

[3] hemorrhage

* **Retinophopsia** ← المرض المتعلق بالشبكية

- edema → blurring of vision

- Rapid ↓ of vision (due to exudative RD)

* Signs:-

	Benign	Malignant	Toxaemia of pregnancy
vessels	sclerotic change	sclerotic spasm	spasm → Ischaemia
Hge	Flame-shaped	Flame-shaped	Flame-shaped
Exudates	Hard (rounded)	Soft	Soft
Macular star 	absent	Present	present
Retinal edema	absent or mild	present in the Retina and disc	present (ritina / disc)
significance	cardiac, cerebral accidents	usually due to Renal Failure	Termination of pregnancy must be done to save life

* Diabetic retinopathy (DR) :-

* Def :- it's a micro-angiopathy effecting the retinal arterioles, capillaries and venules. Always bilateral but asymmetrical.

* duration زادت الكفاءة
* support and repair (pericytes) leave

* Etiology :-

IDM more than 10 years so DR is related to duration of DM
DM not related to severity of DM

* Risk Factors :-

- [1] Young age and long duration
- [2] poor control of DM
- [3] Coexisting hypertension
- [4] obesity and hyperlipidemia
- [5] nephropathy and pregnancy

* Pathogenesis :-
 pericytes → hyperplasia → thickening of basement
 due to glycogen deposition
 ↓ diffusion retinal ischemia
 hemorrhage

* Signs :-

- [1] Non-proliferative :-
 - dot hge
 - Deep hard exudates
 - Retinal edema
 - Retinal vessels micro-aneurysms

- [2] pre-proliferative :-
 - blot hge
 - soft cotton wool spots

channel between b.v → - IRMA (intra retinal-micro vascular abnormalitis) + venous beading + looping

[3] proliferative DR:- pre-proliferative + new vessels

- The disc around the disc

* يحدد الدكتور شرح على مجموعة صور ^

* Complication:-

[1] ↓ night vision

[2] Field defect

[3] Rupture of large BV vitreous hge

[4] iris burn

bloodvessles ← due to newvascular glaucoma *

Craig therapy ← في حزمة الكاه تكون العلاج

* Cyclo photo coagulation → اني اقوا بتجوير آليز قد ممكن من الشبكية
عشان اقلل احتياج الانسولين الشبكية المتبقية تروح لل Fovea عشان اطاف
على النظر

* شرح صور ^

* Degeneration of the Retina:-

Def:- its heredo-Familial, bilateral, progressive pigmenty retinal degeneration of unknown etiology.

* Etiology:- [1] Abiotrophy → ischemia and vit A ↓

[2] phototoxicity

[3] Hereditary

* symptoms:-

[1] night bilindness due to effecton of red.

[2] progressive visual Field contraction

[3] Finally, complet loss of vision

* Signs:-

[1] Fundus picture:- Retina spider (Bone corpuscle) like pigmented spots at equator.

- vessels, Markedly attenuated

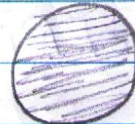
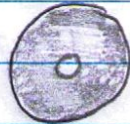
- Disc consecutive optic atrophy (waxy or pale disc)

[2] Field changes:- Early:- ring (annular) scotoma due to equatorial pigmentary degeneration..

- peripheral not continuous with the blind spot
- Has no nasal step

Secendry glaucoma ثانوي الزرق ثانوي *

* Late:- tubular field - complete loss of vision



* pigmentary glaucoma $\xrightarrow{\text{تقرح}} \text{lactic acid} \xrightarrow{\text{تدخل}} \text{Lens} \xrightarrow{\text{دائري}} \text{cataract}$

* general syndromes as:-

[1] Bardet-Biedel syndrome:- obesity and hypogonadism due to hypopituitarism)

- Mental Retardation
- polydactyly + RP

[2] Refsum Syndrome:- Deafness

- Ataxia

- polyneuropathy

- cardiomyopathy

* **Ammaurotic Family Idiocy**:- (الزرق العائلي)

it's lipid degeneration of the ganglion cells of the brain (idicy and general paralysis) and retinal (blind and white retina)

جewish children الزرق عائلي *

* onset:- Appears in the first years of life and death 1-2 years

* Fundus:- 1-cherry red spot
2-consecutive optic atrophy

* Retinal Detachment (RD)

it's a condition in which the retina is separated into 2 layers:-

- [1] Retinal pigment epith
- [2] sensory retina

* Etiology of RD → Trauma

The clinical picture:- Symptoms:-

- * Early:-
 - Flashes of light photopsia due to mechanical irritation of rods and cones by vitreous traction.
 - Floaters ذوائب
 - Metamorphopsia, micropsia, macropsia
- * Late:-
 - Field defect
 - Failure of vision

* Signs:- [1] R.R:- Grey, wavy, opaque.

[2] Tonometry:- soft due to absorption of SRF by choroidal vessels.

- extension of inflammation to CB.

[3] pupil:- Afferent pupillary defect in total DR.

[4] slit lamp:-

[5] ophthalmoscope:- Retina:- Thick, wavy, grayish, convex and undulates freely with eye movements in Fresh RD

- Retinal vessels: wavy and dark

* The proliferative vitreo-retinopathy due to proliferative membranes:-

- on the inner retinal surface
- on the outer retinal surface

* Complication :-

- [1] Iridocyclitis → حمى العين
- [2] Total RD due to spread of tear.
- [3] Retinal degeneration
- [4] Rubesis Iridis.
- [5] PVR proliferative vitreoretinopathy
- [6] Atrophia bulbi

* Treatment :-

* Prophylaxis :-

- Retinal tear → sealing فتدحيم الشق
- Aphakia + Myopic ← المرئىون عنة

- Break → Large

- superior → spread rapidly by gravity

* Technique of sealing :-

most breaks are adequately treated by :-

- * Argon Laser
- * Cryotherapy

* Curative :- [1] sealing of the break

by - cryotherapy - Laser

which will induce sterile chorio-retinitis → that heals by chorio-retinal scar → adhesion between retina and choroid that prevents leakage of fluid under the retina → prevent spread.

[2] Approximation of the retina and choroid (reposition of the retina)

- Evacuate the subretinal fluid
- scleral buckling

[3] pars plana vitrectomy + intra-vitreous infection of silicon oil (to relieve retina from vitreous-retinal traction).

* ملاحظة :-
- طباً حاولت قدر المستطاع التنبؤ كل حالة قالها الدكتور
- أسفة إذا في أخطاء إملائية أو أي قصور في التلخيص

بالتوفيق

مروى الحادي

~~روى~~